REMARKS

Clarifying amendments have been made to claims 8 and 10. These are not considered to affect the scope of the claims.

Regarding the 102(b) rejection of claims 2, 5, 7-8 and 10 over Zabinski

As to claims 2, 7, 8 and 10: Claim 2 requires that the film contain voids. Applicants are unable to find any mention of voids in Zabinski. In the examiner's exposition regarding Zabinski as applied to claim 2, there is no citation of any teaching regarding "voids" in the Zabinski reference. At page 4, penultimate line the examiner says that "voids appear to be suggested by the process", but this is merely conclusory; there is no citation of the reference to support such an inference, nor is there scientific reasoning to support it. In restating the 102(b) rejection on page 8, the examiner ignores the "voids" limitation altogether. Therefore, the examiner has failed to establish the factual basis for this rejection.

Not only does Zabinski fail to mention films having voids, his discussion on column 4 regarding densities would no longer make sense if the film contained voids. That discussion amounts to a way to calculate relative Ti and C deposition rates based on the final film density. None of this would make any sense if the film contained voids. The column 4 discussion clearly indicates that Zabinski only contemplates that he will manufacture fully dense films. Zabinski describes no methods by which he can make films that contain voids.

Further as to claims 8 and 10, Zabinski describes no film having voids extending through its thickness, nor any way to produce such a film.

As to claim 5: Claim 5 requires that the carbon source contains pieces of the metal element. Not only does Zabinski fail to teach this, but a "principal feature" of Zabinski is the use of separate, independently operated Ti and C sources (column 4 lines 3-5; see also his figure 1 and accompanying text). Thus Zabinski not only fails to teach the claim 5 process, but in fact teaches to conduct the sputtering in a different way.

Regarding the 102(b) rejection of claims 2, 7 and 8 over Iwamura

Applicants' claims 2, 7 and 8 all are drawn to a film having voids. Applicants are unable to find anything in the Iwamura reference that describes a film having voids.

The examiner refers to Figures 3-5 as showing voids, but they show no such thing. These micrographs show the crystalline structure of graphite at extremely small scales. All of the features that appear in the micrographs are well less than 1 nanometer in size (please take note of the scale bar that appears in each of these figures); these lengths correspond to something very close to the inter-atomic distances between individual atoms, not anything that could reasonably be considered as "voids". Furthermore, the light and dark regions do not correspond to regions where there is matter and where there is not matter; instead they denote the regions boundaries of the graphite lattice structure. In other words, neither the dark nor the light regions of these figures designate voids of any kind. Iwamura does not describe any features within figures 3-5 as being "voids" of any kind.

Concerning the 102(b) rejection of claims 2 and 7-8 over Bauer

Claims 2 and 7-8 specify a film that contains voids. Applicants are unable to identify any description within the Bauer reference of a film that contains voids. Bauer certainly does not say that his film contains voids, nor does he report any data consistent with his film containing voids.

The examiner appears to infer that the Bauer film contains voids, based on some similarities between the process of applicant's examples and Bauer's process (namely, the elemental composition and that both processes use magnetic sputtering).

But the mere use of the same elements and magnetic sputtering, without more, will not lead to a film that contains voids. This is shown by Zabinski, which also makes films that contain the same elements and are deposited by magnetic sputtering, but which clearly do not contain voids.

Furthermore, the Bauer process is not the same as that of the applicants' examples. On this point, the examiner is asked to take the complete descriptions of Bauer's process and applicants' process into consideration, not just those parts which happen to be similar to each other. In particular, Bauer's pressures are much different than applicants'; as discussed below and in previous responses, operating pressure plays a large role in how the material deposits and therefore in the morphology of the deposited film.

Furthermore, the preparation of a porous film would seem to be at odds with Bauer's stated objective to form hard, diamond-like films for tribological applications.

To conclude, then, the rejection cannot stand because (1) Bauer does not describe that his films contain voids (2), Bauer's process is different in significant respects from the processes that applicants have described and (3) to the extent that the Bauer process has features in common with applicants' process, those similarities do not result in a porous film (as shown by Zabinski).

Concerning the rejection of claim 6 under §102(b) over Nelson

Claim 6 requires a carbon source that contains pieces of Ti, Zr, Hf or Y. Nelson does not describe such a carbon source, and so fails to anticipate the claim (or render it obvious).

Nelson explicitly states that his titanium and carbon layers are to be applied sequentially, to form an interfacial layer of titanium between an underlying substrate and the later-applied carbon layer. *See* column 4 lines 29-37.

In addition, Nelson does not describe forming a film of amorphous carbon containing Ti, Zr, Hf or Y. Instead, Nelson describes forming separate titanium and carbon layers.

Concerning the 103(a) rejection of claims 1 and 11 over Zabinski as evidenced by Takami

The examiner's attention is drawn to the claim 1 limitation that the second, lower density regions of the film extend at least partway through the film "in a thickness direction". As described in the specification (and in earlier responses) these low density regions take the form of "columns" that permeate at least partway through the thickness of the film/

Applicants see nothing in Zabinski that describes this feature, either explicitly or implicitly. In addition, applicants are unable to find any place in the office action where the examiner identifies this feature in the Zabinski reference. Instead, the examiner appears to be saying either (1) these low density columns can be produced easily on the basis of Zabinski through control of deposition rates or (2) Zabinski's process is identical to the applicants', and therefore would produce the same product.

As to (1): the discussion of column 4 of Zabinski applies to the density of his film as a whole, not to distinct regions within the film. The thrust of column 4 of Zabinski is that the overall film density can be controlled by varying titanium to carbon ratios. However, this is much different from controlling the density of specific regions within the film, and

even more different than controlling the density of specific column-like regions that extend through the thickness of the film. Zabinski nowhere describes either a) in interest in forming lower density regions through the thickness of the film or b) any way of doing so.

As to (2): The examiner is encouraged to re-read page 6 line 28 through page 8 line 24 of applicants' specification. That section describes specific conditions that are needed to form a film having the column-like, low density regions. These include a source of carbon which contains the metal element (such as a chip that can be disposed on or built on calcined graphite); see page 7 lines 27 et seq. This feature is not described anywhere in Zabinski; to the contrary, a "principal feature" of Zabinski is "independent operation of Ti and C sources".

In addition, substrate temperature and specific operating pressure are also needed to produce the columnar structure. As discussed in previous responses, the operating pressure that the applicants use to produce films of claim 1 is not disclosed in Zabinski.

Therefore, the specific conditions Zabinski uses to produce his films are in fact different from those that applicants use to produce their films.

Furthermore, there is nothing whatsoever in Zabinski to suggest that the morphology of the film (as opposed to mere density) would be affected whatsoever by the selection of the particular carbon/metal source, temperature and operating pressure. Thus, applicants cannot agree the selection of applicants' particular operating parameters can be fairly characterized as mere "optimization" of "result-effective variables". There is nothing in Zabinski to suggest that variation of these parameters has any effect on the morphology of the film, and in particular the formation of columnar lower density regions. All Zabinski teaches is that one can produce a higher density film by including more of the higher density element in it.

For clarity, applicants point out here that they are not arguing that claims 1 or 11 include process elements, or are limited to films produced by certain processes. Instead, applicants are merely responding to the examiner's implicit position that Zabinski describes identical manufacturing methods and therefore would be expected to produce a product having the characteristics of the film of applicants' claims 1 and 11. The applicants have shown that Zabinski's films are made in a different way; that because the manufacturing conditions are different (and because Zabinski nowhere describes any films with the "column-like" structure specified in applicants' claim 1 or how to make such films), there is no basis to conclude either that Zabinski's films are the same as the claim 1 or 11 films, or

that applicants' claim 1 or 11 films are obvious variants of Zabinski's films. To repeat, Zabinski describes no methods to make films like those of applicants' claims 1 or 11, nor does Zabinski teach or suggest any process variables which would result in such films.

Concerning the 103(a) rejection of claims 1 and 11 over Iwamura as evidenced by Takami

This rejection is traversed for exactly the same reasons as is the obviousness rejection over Zabinski. Claims 1 and 11 require the film to contain low density regions that extend in a thickness direction of the film. There is nothing in Iwamura that explicitly or implicitly describes this feature, any way whatsoever to produce a film having this feature, or any reason to do so. The specific conditions Iwamura uses to produce his films are different from those that applicants use to produce their films.

To get from the Iwamura reference to applicants' claim 1 and 11 inventions, one would have to (1) infer, with no basis in the Iwamura reference, that there was some reason to produce a film having column-like low density regions, and (2) discover, with no guidance whatsoever from the reference, some manner to produce such films. The examiner's attention is directed to the fact that Iwamura produces two *different* layers, one atop the other, which have different hardnesses. The claim 1 and 11 invention is not multiple layers which have different hardnesses, but instead a *single* layer which has high and low density regions of a specific geometry. The Iwamura reference not only fails to describe this (or suggest it), but utterly fails to describe any way in which such a film can be produced.

Respectfully submitted,
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